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We Live in a Radian World

By Thomas Kidd - [January-March 2011](#)

Our atmosphere is filled with electromagnetic energy from many sources. These include manmade emissions from sensors and communications equipment, electrical power lines and generators, as well as natural emissions from lightning, the sun, cosmic radiation and other sources. The electromagnetic environment is all around us every day. For example, electromagnetic energy from the sun reflects off the moon and refracts through the atmosphere to create the illusion of the harvest moon, the effect that makes the moon appear larger soon after the autumnal equinox.

Light is electromagnetic radiation. Energy arriving from the sun as infrared light warms the atmosphere, oceans and land. And when we sit in front of a campfire, we feel electromagnetic radiation, also in the form of infrared energy, warming our fingers and toes. Radio waves from the sun and distant stars can be heard as AM radio static, and on a stormy night that radio will crackle from the electromagnetic radiation released by lightning. We live in a radiant world with a very active electromagnetic environment.

Technology both impacts the electromagnetic environment and is susceptible to its negative effects. Electromagnetic energy can significantly affect Navy and Marine Corps capabilities and affect operations, training and safety. We all experience some of these effects when noise from our cell phones interferes with our music player. Those pulsating beeps and buzzing sounds are electromagnetic interference. But while cell phone noise may be a nuisance in our personal lives, electromagnetic interference to and from military systems can have significant effects on their operations.

It is critical that the Department of the Navy effectively manages and mitigates these negative effects during the planning, management and operation of installations, and during the construction and maintenance of their utilities infrastructure. In the future, as wires are replaced by wireless technology and our Sailors and Marines become more integrated into the Naval Networking Environment, the electromagnetic environment and its effects on systems must be associated with the performance attributes of emerging technology that are necessary to provide the operational capabilities required by the warfighter.

Negative electromagnetic environmental effects can not only degrade the performance of systems, but they can also place personnel at risk, damage equipment, or even trigger catastrophic events such as the unintended detonation of ordnance or the ignition of fuels. Unless the electromagnetic environment is considered during research, development and acquisition, these effects can also increase the life cycle costs of weapons systems, automated information systems, and other systems that are instrumental to the success of the Sailors and Marines who are carrying out the DON's mission.

The Department of the Navy continually strives to identify, understand, address and mitigate electromagnetic environmental effects to accomplish its warfighting missions. Because we live in a radiant world, we must all strive to minimize our impact on the electromagnetic environment and its impact on us.

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Necessary actions associated with the acquisition of spectrum equipment are identified in Department of Defense (DoD) Instruction 3222.3: "DoD Electromagnetic Environmental Effects (E3) Program." The instruction states that it is DoD policy that:

- All electrical and electronic systems, subsystems, and equipment, including ordnance containing electrically initiated devices, shall be mutually compatible in their intended electromagnetic environment (EME) without causing or suffering unacceptable mission degradation due to E3.

- Identification of requirements for E3 control shall be initiated early during the

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concept refinement and technology development phases, fully defined prior to Milestone C, and verified throughout the acquisition process. Pertinent documents such as Capability Development Documents (CDDs), Capability Production Documents (CPDs), equipment specifications, Information Support Plans (ISPs), and Test and Evaluation Master Plans (TEMPS) shall specify, define, and verify E3 control requirements, as appropriate.

-- Operational effectiveness and suitability of all DoD weapons, command, control, communications, intelligence, surveillance, reconnaissance, and information systems in the intended operational EME shall be demonstrated.

-- E3 issues shall be identified and assessed prior to entering the Systems Demonstration and Production and Deployment phases and shall be addressed during critical design reviews. TEMPs shall include within the scope of critical operational issues and sub-issues, the requirement to demonstrate the effective E3 control of systems, subsystems, and equipment.

-- The operational electromagnetic compatibility disposition of systems, subsystems, and equipment shall be reported in the ISP or in other management/support plans.

-- Hazards of Electromagnetic Radiation to Ordnance (HERO), Hazards of Electromagnetic Radiation to Personnel, and Hazards of Electromagnetic Radiation to Fuel shall be mitigated prior to the conduct of all military exercises, operations, and activities.

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